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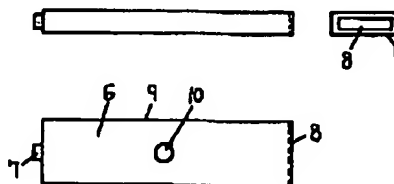
(54) **SQUARE TYPE SEALED ALKALINE STORAGE BATTERY AND CHARGER THEREFOR**

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(57) Abstract

**PURPOSE:** To provide a square type sealed alkaline storage battery having the capability of preventing quick charging or reverse charging with a conventional charger, and allowing simple and proper charging, regarding a square type sealed alkaline storage battery using hydrogen storage alloy for a negative electrode.

**CONSTITUTION:** In a square type sealed alkaline storage battery using hydrogen storage alloy for a negative electrode, a metal case exposure section 10 is formed at a part of the side of a metal case 6 covered with an outer resin tube, and the exposure section 10 is used as a terminal for an electrode at one side. According to this construction, the battery, even if connected to a conventional charger in error, can be protected against quick charging, because of a different terminal position. Furthermore, the use of a dedicated charger can ensure proper charging without any leakage of an electrolyte outside due to an internal pressure rise at a charging process.



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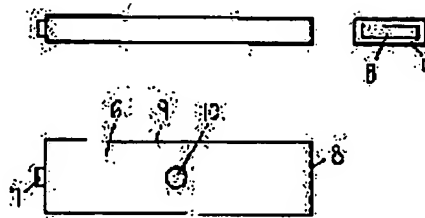
### (54) SQUARE TYPE SEALED ALKALINE STORAGE BATTERY AND CHARGER THEREFOR

#### (57)Abstract:

**PURPOSE:** To provide a square type sealed alkaline storage battery having the capability of preventing quick charging or reverse charging with a conventional charger, and allowing simple and proper charging, regarding a square type sealed alkaline storage battery using hydrogen storage alloy for a negative electrode.

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According to this construction, the battery, even if connected to a conventional charger in error, can be protected against quick charging, because of a different terminal position. Furthermore, the use of a dedicated charger can ensure proper charging without any leakage of an electrolyte



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The positive-electrode plate of the shape of a rectangle which makes a metal hydroxide a main component, and the negative-electrode plate of the shape of a rectangle which makes a hydrogen storing metal alloy a main component, Contain the generation-of-electrical-energy element which serves as a separator from the alkali electrolytic solution to the metal casing of the square shape which serves as the terminal of one pole, and said metal casing is obturated with the metal lid equipped with the cap which serves as the terminal of the pole of another side. The square shape sealing alkaline battery which is a square shape sealing alkaline battery which covered said the greater part of metal casing with the sheathing resin tube, formed the exposed part of metal casing in a part of side face of the metal casing covered with said sheathing resin tube, and used this exposed part as the terminal of one pole.

[Claim 2] The square shape sealing alkaline battery according to claim 1 which formed the exposed part of metal casing in the central part of the side face of said metal casing, and used this exposed part as the terminal of one pole.

[Claim 3] The positive-electrode plate of the shape of a rectangle which makes a metal hydroxide a main component, and the negative-electrode plate of the shape of a rectangle which makes a hydrogen storing metal alloy a main component, Contain the generation-of-electrical-energy element which serves as a separator from the alkali electrolytic solution to the metal casing of the square shape which serves as the terminal of one pole, and said metal casing is obturated with the metal lid equipped with the cap which serves as the terminal of the pole of another side. While being the square shape sealing alkaline battery which covered said the greater part of metal casing with the sheathing resin tube and equipping a part of side face of said metal casing with an overheating prevention component said overheating prevention component itself -- or the square shape sealing alkaline battery which exposed some lead plates linked to this, and used this exposed part as the terminal of one pole.

[Claim 4] The battery charger of the square shape sealing alkaline battery which was the battery charger which charges by setting a square shape sealing alkaline battery according to claim 1 or 3 to the crevice, prepared the terminal of a pole and prepared the terminal of the pole of another side corresponding to the exposed part of metal casing while [ corresponding to the cap of said square shape sealing alkaline battery ] in one side face or the both-sides side which counters of said crevice at the central part of the base of said crevice.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the terminal structure and the battery charger corresponding to this of a square shape sealing alkaline battery especially.

[0002]

[Description of the Prior Art] Although small sealing alkaline batteries, such as a nickel cadmium battery, are used as a power source of a portable device from the former, especially the nickel cadmium battery of a square shape is widely used as a power source of a portable cassette tape player.

[0003] Moreover, generally as a battery charger of the nickel cadmium battery of this square shape, the battery charger as shown in drawing 8 is used.

[0004] As shown in drawing 8, the crevice 2 is established in the battery charger of the conventional nickel cadmium battery at the whole surface (top face) of a battery charger 1, the positive-electrode terminal 3 is formed in one side face of this crevice 2, and the negative-electrode terminal 4 is formed in the side face which countered said side face. And a nickel cadmium battery is set to this crevice 2, and boosting charge which inserts a plug 5 in AC plug socket, and makes a cell a full charge within [ in 1 hour ] is performed.

[0005] Moreover, from the square shape nickel cadmium battery, it is high capacity, and the nickel cadmium battery, and the compatible square shape nickel and hydrogen battery are proposed, and it considers using the above-mentioned battery charger in recent years at the time of the charge.

[0006]

[Problem(s) to be Solved by the Invention] However, when boosting charge which makes a cell a full charge for square shape nickel and a hydrogen battery within [ in 1 hour ] using the above-mentioned battery charger was performed, by the nickel and the hydrogen battery by which a boosting-charge property differs from a nickel cadmium battery, the problem that cell internal pressure rose quickly and the electrolytic solution spilt liquid to the cell exterior had arisen.

[0007] Moreover, in the conventional battery charger, since it had not prepared, when the incorrect connection prevention device made forward [ of a cell ], and a negative electrode reverse and they were set to this battery charger, it had the problem that a cell was reverse-charged.

[0008] This invention can solve such a technical problem, can prevent certainly carrying out boosting charge, even if it sets nickel and a hydrogen battery to the conventional battery charger accidentally, or making forward [ of a cell ], and a negative electrode reverse and reverse-charging, can be charged only corresponding to the battery charger of dedication, and offers the square shape sealing alkaline battery which can improve the safety at the time of charge of a cell, and its battery charger.

[0009]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the square shape sealing alkaline battery of this invention The positive-electrode plate of the shape of a rectangle which makes a metal hydroxide a main component, and the negative-electrode plate of the shape of a rectangle which makes a hydrogen storing metal alloy a main component, Contain the generation-of-

electrical-energy element which serves as a separator from the alkali electrolytic solution to the metal casing of the square shape which serves as the terminal of one pole, and said metal casing is obturated with the metal lid equipped with the cap which serves as the terminal of the pole of another side. In the square shape sealing alkaline battery which carried out pre-insulation of said the greater part of metal casing with the sheathing resin tube, the exposed part of metal casing is formed in a part of side face of the metal casing which carried out pre-insulation by said sheathing resin tube, and let the exposed part of this metal casing be the terminal of one pole.

[0010] Here, as for the metal casing covered with said sheathing resin tube, it is desirable to form the exposed part of metal casing in the central part of that side face, and to use this exposed part as the terminal of one pole.

[0011] Moreover, it is desirable to have prepared the terminal of the pole of another side corresponding to [ prepare the terminal of a pole and ] the exposed part of metal casing to the central part of the base of said crevice while corresponding to [ to one side face or the both-sides side which counters of a crevice of a battery charger ] said cap in the battery charger which charges said square shape sealing alkaline battery.

[0012] moreover -- while equipping a part of side face of metal casing with an overheating prevention component in said square shape sealing alkaline battery -- the case of this overheating prevention component itself -- or it is desirable to expose some lead plates linked to it, and to use this exposed part as the terminal of one pole.

[0013]

[Function] In the square shape sealing alkaline battery of this invention, conventionally, pre-insulation of all the partes basilaris ossis occipitalis of the metal casing used as the terminal of one pole and side faces is carried out by the sheathing tube, the exposed part of metal casing is formed in a part of side face of metal casing, and this exposed part is used as the terminal of one pole.

[0014] For this reason, even if it is going to set and carry out boosting charge of the square shape sealing alkaline battery of this invention to the conventional battery charger accidentally, since the locations of a terminal differ, boosting charge is not carried out to the conventional cell.

[0015] Moreover, it can prevent that it is possible to charge only by using the exclusive battery charger for the square shape sealing alkaline batteries of this invention, can charge nickel and a hydrogen battery on proper charge conditions by this, cell internal pressure rises at the time of charge, and the electrolytic solution spills liquid to the cell exterior.

[0016] Moreover, in the square shape sealing alkaline battery of this invention equipped with the overheating prevention component, some lead plates linked to the case of the overheating prevention component itself prepared in the side face of metal casing or it are exposed, and this exposed part is used as the terminal of one pole.

[0017] Therefore, since an overheating prevention component senses the overcurrent and overheating at the time of charge quickly and operates, the safety at the time of charge of a square shape sealing alkaline battery can be raised.

[0018]

[Example] Hereafter, the example of this invention is explained, referring to a drawing.

[0019] The appearance configuration of the square shape sealing alkaline battery of this invention is shown in drawing 1 . As shown in drawing 1 , after containing rectangle-like forward, a predetermined negative-electrode plate, and a predetermined separator to the metal casing 6 of a square shape and pouring in the alkali electrolytic solution, opening of said metal casing 6 was obturated with the metal lid equipped with the cap 7 which serves both as a positive-electrode terminal. Subsequently, the sheet metal 8 made from a polyvinyl chloride of reliance was in the whole pars basilaris ossis occipitalis of metal casing 6, and it covered with the predetermined heat shrink nature resin tube 9 for sheathing ranging over the whole side face of metal casing 6, and the perimeter of sheet metal 8. At this time, the hole was opened in the tube corresponding to the central part of the side face of metal casing 6, the exposed part 10 of metal casing was formed, and this exposed part 10 was used as the negative-electrode terminal. And the square shape sealing alkaline battery of nominal capacity 800mAh which carried out

in this way and was produced was used as the cell A of this invention.

[0020] As shown in drawing 2, in the same square shape sealing alkaline battery as the above, by moreover, specification as shown in (Table 1) at the central part of the side face of metal casing 6 The PTC component 11 (thermal element) which is dimension 5mmx7mm is soldered. After covering the side face and the PTC component 11 of metal casing 6 with said heat shrink nature resin tube 9, some heat-shrinkable tubing 9 which has covered the PTC component 11 was cut and lacked, and some cases of the PTC component 11 were exposed. And the square shape sealing alkaline battery which used the exposed part 12 of this PTC component 11 as the negative-electrode terminal was used as the cell B of this invention.

[0021]

[Table 1]

素子の抵抗値 (25℃)	130 mΩ	
雰囲気温度と抵抗が 上昇する電流値	20℃	1.80 A
	40℃	1.55 A
	60℃	1.25 A
	80℃	1.00 A

[0022] Next, the battery charger for square shape sealing alkaline batteries of this invention is shown in drawing 3.

[0023] As shown in drawing 3, the positive-electrode terminal 3 is formed in the crevice 2 of the battery charger 1 of this invention on the one side face, and the negative-electrode terminal 4 is formed in the central part of the base of a crevice 2. In addition, 5 is a plug.

[0024] Subsequently, after charging the square shape sealing alkaline batteries A and B of this invention with the battery charger of this invention, the charge-and-discharge curve when performing discharge is shown in drawing 4. Here, it charged with the 800mA current, and the charge and discharge test discharged with the 150mA current, and was performed.

[0025] As shown in drawing 4, only in 0.1 V, by the cell B of this invention, the electrical potential difference at the time of charge became high compared with Cell A. Although this is because the resistance at the time of the ordinary temperature of a PTC component is 130mohm and charged through this, since the rise of this charge electrical potential difference is included in the error range of a design of a battery charger, it does not become a failure at the time of cell use. Moreover, the electrical potential difference at the time of discharge of the cell B of this invention only descended 0.02V to this invention cell A, and the fall of discharge capacity was not seen.

[0026] Moreover, in the square shape sealing alkaline battery of this invention, since terminal structure differed from the conventional cell even if it is going to set and carry out boosting charge to the conventional battery charger, and it could not charge, the liquid spill to the cell exterior of the electrolytic solution by boosting charge was able to be prevented.

[0027] Next, charge by the high current was performed using the cell B of this invention, and the safety of the cell at this time was investigated. Here, charge was performed with the current of 1.6A in 25 degrees C. The result at this time is shown in drawing 5.

[0028] As shown in drawing 5, by the cell B of this invention, the PTC component was able to carry out the temperature rise in about 1 minute after charge initiation, the resistance was able to rise remarkably, the charging current was able to be reduced, and charge by the high current beyond it was able to be prevented.

[0029] In addition, although some heat shrink nature resin tubes which have covered the PTC component were cut and lacked, the PTC component was exposed and this exposed part was used as the negative-electrode terminal in the example of this invention, as shown in drawing 6, the PTC component equipped with the lead plate is welded to metal casing, a part of that lead plate is exposed,

and it is good also considering this exposed part as a negative-electrode terminal.

[0030] Moreover, although the battery charger as shown in drawing 3 was used in the example of this invention, it may be prepared in the both-sides side where the positive-electrode terminal 3 counters as shown in drawing 7, respectively. If the negative-electrode terminal 4 of a battery charger 1 is in contact with the exposed part of the metal casing of a cell even if it makes the sense of a cell into right-and-left reverse and sets to a battery charger by this, it can charge regardless of the sense of a cell and can charge simply easily from before.

[0031]

[Effect of the Invention] As mentioned above, in the square shape sealing alkaline battery of this invention, since the exposed part of metal casing is formed in a part of side face of the metal casing covered with the sheathing resin tube and this exposed part is used as the terminal of one pole, even if it is going to set and carry out boosting charge to the conventional battery charger, since terminal locations differ, boosting charge is not accidentally carried out to the conventional cell.

[0032] And by using the battery charger of this invention, proper charge is made automatically, cell temperature and internal pressure carry out an abnormality rise at the time of charge, and the electrolytic solution does not spill liquid outside.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] The appearance configuration Fig. showing square shape sealing alkaline battery A of this invention

[Drawing 2] The appearance configuration Fig. showing square shape sealing alkaline battery B of this invention using a PTC component

[Drawing 3] Drawing showing the battery charger for charging the square shape sealing alkaline battery of this invention

[Drawing 4] Drawing showing the charge-and-discharge curve of the square shape sealing alkaline battery of this invention

[Drawing 5] The property Fig. when charging square shape sealing alkaline battery B of this invention using a PTC component by the high current

[Drawing 6] The appearance configuration Fig. showing other examples of square shape sealing alkaline battery B of this invention using a PTC component

[Drawing 7] Drawing showing other examples of the battery charger for charging the square shape sealing alkaline battery of this invention

[Drawing 8] Drawing showing the battery charger for charging the conventional square shape sealing alkaline battery

[Description of Notations]

- 1 Battery Charger
- 2 Crevice
- 3 Positive-Electrode Terminal
- 4 Negative-Electrode Terminal
- 5 Plug
- 6 Metal Casing
- 7 Cap
- 8 Sheet Metal
- 9 Heat Shrink Nature Resin Tube
- 10 Exposed Part of Metal Casing
- 11 PTC Component
- 12 Exposed Part of PTC Component
- 13 Lead Plate of PTC Component
- 14 Exposed Part of Lead Plate of PTC Component

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## \* NOTICES \*

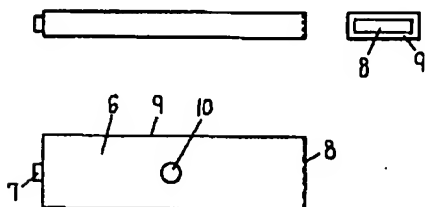
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## DRAWINGS

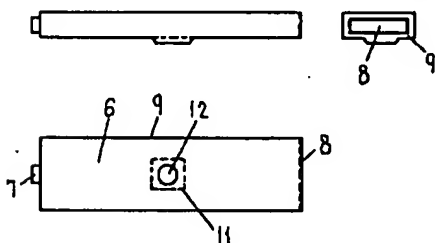
[Drawing 1]

- 6---金属ケース
- 7---キャップ
- 8---基板
- 9---絶縁絶縁テープ
- 10---金属ケースの露出部分



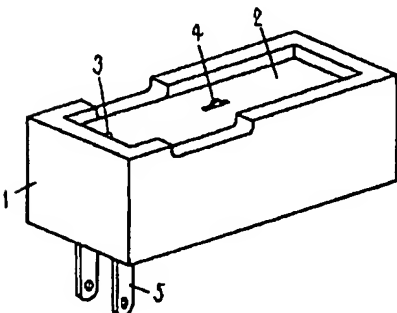
[Drawing 2]

- 11---PTC素子
- 12---PTC素子の露出部分

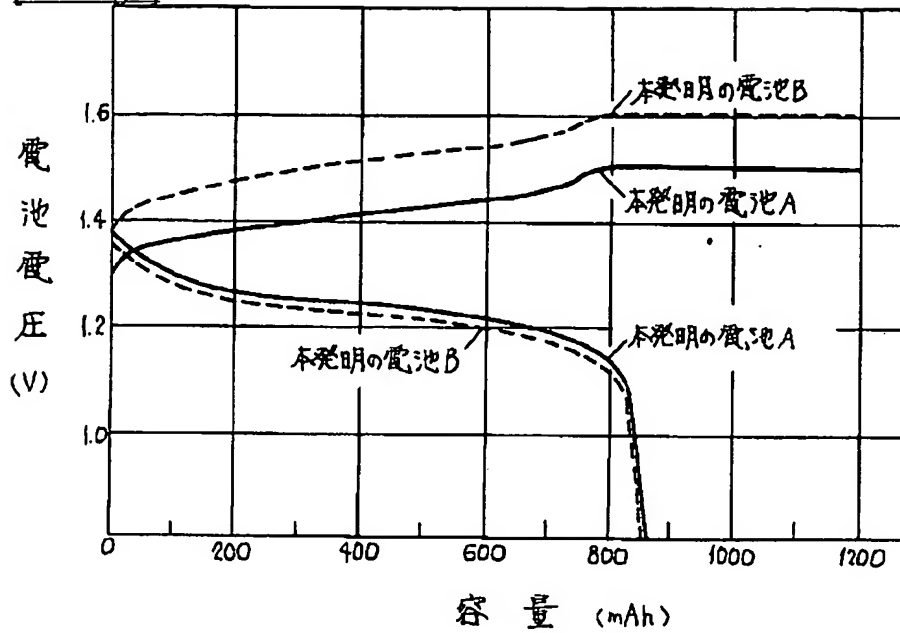


[Drawing 3]

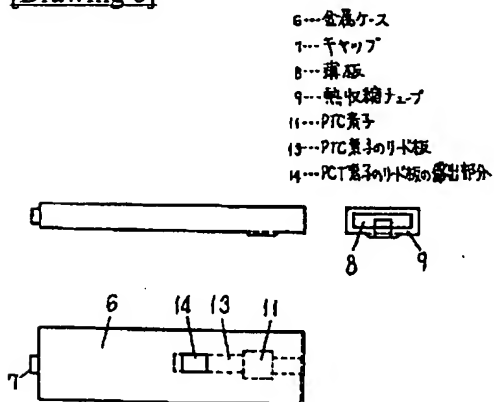
- 1---充電器
- 2---凹部
- 3---正極端子
- 4---負極端子
- 5---プラグ



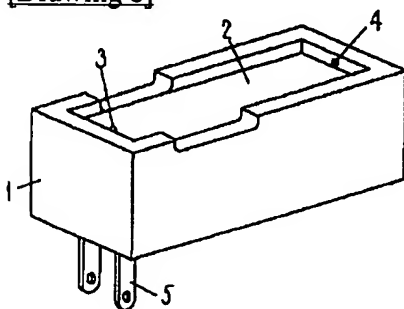
[Drawing 4]



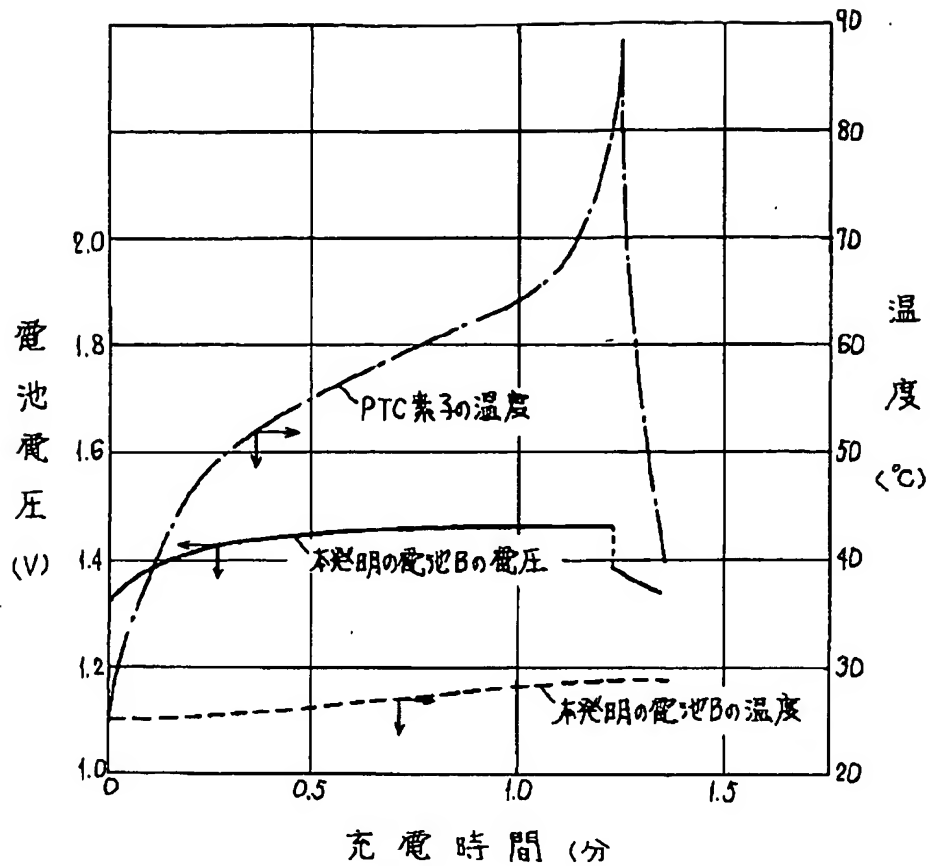
[Drawing 6]



[Drawing 8]

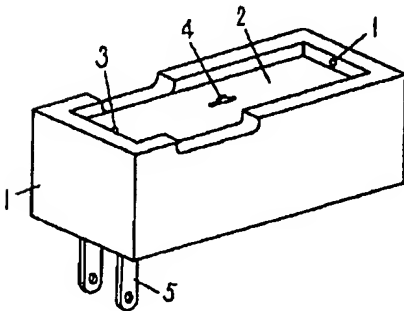


[Drawing 5]



[Drawing 7]

- 1...充電器
- 2...凹部
- 3...正極端子
- 4...負極端子
- 5...プラグ



[Translation done.]